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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention is installed in the style of a gate, a car, etc. path on the street, and relates to the image pick-up equipment for a monitor on the street for supervising existence, such as an obstruction on the street, by the image all day and night.

[0002]

[Description of the Prior Art] As this conventional kind of equipment, there is obstruction detection equipment indicated by JP,5-296766,A (it is hereafter described as an official report 1). The optical system which drawing 7 is drawing showing the obstruction detection equipment indicated by the official report 1, and consists of two or more lenses and diaphragm 702 grades for 701 to carry out image formation of the two images in juxtaposition through the path divided in the objective (obstruction) image in drawing, 703 is the image sensor which consists of a pixel of mxn, such as CCD which is made to carry out image formation of the light, and is changed into an electrical signal, it is arranged to optical system 701 at a position, the camera is constituted, and image formation of the two images is carried out by the optical system 701 which carries out image formation of the one failure object image to two images. The sample hold and the CDS circuit where 704 takes out the signal of an image sensor 703, the amplifier circuit which amplifies the signal with which 705 was taken out by the sample-hold & CDS circuit 704, the A/D converter made to change into a digital signal the analog signal with which 706 was amplified by the amplifier circuit 705, the DSP circuit which processes the picture signal to which digital conversion of 707 was carried out by A/D converter 706, and 708 are D/A converters which output the digital signal processed in the DSP circuit 707 as a video signal of an analog. The ranging information which a timing generator (TG) circuit for the driver circuit where 709 makes an image sensor 703 drive, and 710 to read the every 1 pixel charge of an image sensor 703, the memory circuit which memorizes the video signal with which digital processing of 711 was carried out, and 712 are the ranging arithmetic circuits which consist of a microcomputer which calculates the distance of an obstruction from the phase contrast of two images processed by the DSP circuit 707, and was calculated outputs to the collision alarm display circuit 713 and the collision beep sound circuit 714. 716 is visible / infrared change-over circuit which performs a switch with the light and infrared light, and a switch is alternatively performed by the external-environment detector 717 which detects the external-environment condition of a car. In addition, the image sensor 703 is divided into two fields, the field in which the infrared cut-off filter was prepared, and the field which is not prepared.

[0003] It switches whether equipment uses which image of infrared cut-off filter \*\* / nothing for a ranging operation according to environment conditions, such as fog and heavy rain, conventionally which was indicated by the official report 1 by being constituted as mentioned above, carrying out image formation of the two images according to optical system 701, calculating the distance from the phase contrast of the two images to an obstruction, and carrying out a warning output in the ranging count circuit 712.

[0004] Moreover, as another example of this conventional kind of equipment, there is a compound

sensor mold vehicle detector indicated by the patent official report (it is hereafter described as an official report 2) of No. 2850890. Drawing 8 is drawing showing the configuration of the compound sensor mold vehicle detector indicated by the official report 2, and, as for the image pick-up section and 820, 810 is [ the environmental measurement section and 830 ] the signal-processing sections in drawing. The image pick-up section 810 consists of visible CCD camera 811 and an infrared region image pick-up camera 812. The environmental measurement section 820 consists of an illuminometer 821 and a thermometer 822. The signal-processing section 830 consists of video A/D converters 831 and 833, frame memories 832 and 834, a digital signal processor (it is hereafter described as DSP) 835, CPU836, external output I/F837, and A/D converters 838 and 839.

[0005] Equipment is constituted as mentioned above conventionally which was indicated by the official report 2, and it has separately visible CCD camera 811 which receives only the light, and the infrared region image pick-up camera 812 which receives only infrared light, and at the time of the weather, a visible image and an infrared image are acquired to coincidence, car detection processing by DSP835 is performed, and an infrared image usually performs car detection processing in the time of SIGMET like the inside of rain, or rain, and Nighttime.

[0006]

[Problem(s) to be Solved by the Invention] In the conventional technique which the equipment by the conventional technique is the above configurations, and is indicated by the official report 1, since it was constituted so that two kinds of images of infrared cut-off filter \*\* / nothing might be switched and outputted according to an environment condition, the technical problem that both images were unacquirable to coincidence occurred. Moreover, since it was the configuration image formation of the image of the both sides of the light and infrared light is carried out [ configuration ] to the image sensor of the same quality of the material with infrared cut-off filter \*\* / non-chisel, the technical problem that the noise of the infrared image at the time of infrared cut-off filter nothing became large occurred.

[0007] Moreover, in the conventional technique indicated by the official report 2, since it was the configuration separately equipped with the camera for the lights, and the camera for infrared light, the technical problem that equipment became large occurred.

[0008] This invention was made in order to cancel the above technical problems, and it aims at being able to acquire a visible image and an infrared image with few noises to coincidence, and obtaining the compact image pick-up equipment for a road monitor.

[0009]

[Means for Solving the Problem] The window which passes the image light in which the image pick-up equipment for a road monitor by the 1st invention contains the light and infrared light, The photo detector of the light for receiving only the light out of the image light which passes through this window, The image sensor which carried out mixture arrangement of the photo detector of the infrared light for receiving only infrared light near both component, Peltier for maintaining this image sensor at constant temperature, and the temperature control section which performs temperature control of an image sensor, The 1st and 2nd amplifiers which it has corresponding to the photo detectors of the light and infrared light, and amplify the electrical signal of an image, It has the 1st amendment section which performs brightness amendment of the electrical signal which this 1st amplifier outputs, and the 2nd amendment section which performs brightness amendment of the electrical signal which the 2nd amplifier outputs, and it constitutes so that a visible image signal and an infrared picture signal may be outputted separately.

[0010] the image pick-up equipment for a monitor on the street by the 2nd invention is equipped with the image sensor which carries out mutual arrangement of the horizontal direction [ of the light and infrared light ] of each photo detector of every one line perpendicularly, and constitutes one screen.

[0011] the image pick-up equipment for a monitor on the street by the 3rd invention is equipped with the image sensor which carries out mutual arrangement of the perpendicular direction [ of the light and infrared light ] of each photo detector of every one line horizontally, and constitutes one screen.

[0012] The image pick-up equipment for a monitor on the street by the 4th invention is equipped with the image sensor which arranges each photo detector of the light and infrared light in the shape of a

checker, and constitutes one screen.

[0013] The window which passes the image light in which the image pick-up equipment for a monitor on the street by the 5th invention contains the light and infrared light, The image sensor of the light which consists of the element number for one screen for while being reflected and receiving only the light out of image light in the light reflex section which reflects in a 2-way the image light which passes through this window, and this light reflex section, The image sensor of the infrared light which consists of the element number for one screen for receiving only infrared light out of another image light, Peltier for maintaining the image sensor of this infrared light at constant temperature, and the temperature detecting element which detects the temperature of the image sensor of infrared light, The Peltier control section which controls Peltier based on this temperature, and the 1st and 2nd amplifiers which it has corresponding to the photo detectors of the light and infrared light, and amplify the electrical signal of an image, It has the 1st amendment section which performs brightness amendment of the electrical signal which this 1st amplifier outputs, and the 2nd amendment section which performs brightness amendment of the electrical signal which the 2nd amplifier outputs, and it constitutes so that a visible image signal and an infrared picture signal may be outputted separately.

[0014] The image pick-up equipment for a monitor on the street by the 6th invention adds the switch section which performs the switch output of the visible image signal which the 1st amendment section outputs, and the infrared picture signal which the 2nd amendment section outputs.

[0015]

[Embodiment of the Invention] Gestalt 1. drawing 1 of operation is drawing showing the gestalt 1 of implementation of the 1st invention. In drawing, 1 is a window which passes the image light containing the light emitted from the photographic subject which exists in the road, and infrared light, for example, is manufactured by magnesium fluoride material. 2 is an image sensor which receives the image light which passes through this window 1, and outputs the electrical signal of an image. Two or more these image sensors 2 are intermingled near both component, arrange the photo detector 3 of the light for receiving and carrying out photo electric conversion only of the light, and the photo detector 4 of the infrared light for receiving and carrying out photo electric conversion only of the infrared light to a plane, and are equipped with the are recording output sections 5a and 5b for accumulating the electrical signal of an image temporarily and outputting it corresponding to each photo detectors 3 and 4. Moreover, with the window 1, the hermetic seal of the image sensor 2 is carried out, and it is packed. Peltier for 6 to maintain this image sensor 2 at constant temperature, the temperature detecting element which 7 detects the temperature of an image sensor 2 and outputs a temperature signal, The Peltier control section which 8 inputs this temperature signal and controls said Peltier 6, The 1st amplifier for 9a to amplify the electrical signal of the light image outputted from are recording output section 5a in said image sensor 2, The 2nd amplifier for 9b to amplify the electrical signal of the infrared light image outputted from are recording output section 5b in said image sensor 2, The 1st amendment section which 10a performs brightness amendment of the electrical signal which said 1st amplifier 9a outputs, and outputs a visible image signal, The 2nd amendment section which 10b performs brightness amendment of the electrical signal which said 1st amplifier 9b outputs, and outputs an infrared picture signal, and 11 are image pick-up control sections which perform drive control of said image sensor 2. 12 is the synchronizing signal generating section for generating the Vertical Synchronizing signal of 1 field period of an image, the Horizontal Synchronizing signal of a horizontal the period of one line, the pixel clock in a cycle of 1 pixel, etc., and supplying each part. It is the superposition section which is made to superimpose 13a on the visible image signal with which said amendment section 10a outputs the Vertical Synchronizing signal supplied from this synchronizing signal generating section 12, and a Horizontal Synchronizing signal, is made to superimpose the superposition section outputted outside as a composite picture signal, and 13b on the infrared picture signal with which said amendment section 10b outputs the Vertical Synchronizing signal supplied from said synchronizing signal generating section 12, and a Horizontal Synchronizing signal, and is outputted outside as a composite picture signal. A track for a track for 14a and 14b to transmit each picture signal outputted from said amendment sections 10a and 10b and 15 to transmit the Vertical Synchronizing signal, Horizontal

Synchronizing signal, and pixel clock which are outputted from said synchronizing signal generating section 12, and 16a and 16b are the tracks for outputting outside each composite picture signal outputted from said superposition sections 13a and 13b.

[0016] The material of the photo detector 3 of the light is silicon (Si) generally used as a photo detector for the lights, and the band pass filter which passes only the 770nm so-called light from the wavelength of 390nm is added to the front face of each component. On the other hand, the material of the photo detector 4 of infrared light is a vanadium oxide (VOx) which is easy to receive infrared light, and the band pass filter which passes only the limited wavelength range in the so-called infrared light, such as 8 to 12 etc. micrometers, from the wavelength of 3 micrometers is added to the front face of each component. [ 5 micrometers or ] In addition, each one component is equivalent to 1 pixel of an image.

[0017] An infrared image is the so-called temperature image like common knowledge, and since a difference will arise in the light-receiving sensibility of each component if the temperature of each component of the photo detector 4 of infrared light varies, a noise will occur in an image. Peltier 6 is for maintaining the photo detector 4 of each infrared light at constant temperature, such as 40 etc. degrees C. On the other hand, since there is dispersion in the sensibility by a little temperature also in the photo detector 3 of the light, also keeping the photo detector 3 of the light together to constant temperature by Peltier 6 also makes the noise of a visible image reduced.

[0018] Since the electrical signal of the image which each are recording output sections 5a and 5b output is feeble, it needs magnification of signal amplitude. In Amplifiers 9a and 9b, while performing this amplitude magnification, it also has the function to perform the so-called sample hold which holds uniformly the magnification to a time-axis with a pixel clock, i.e., 1-pixel section signal level.

[0019] The amendment sections 10a and 10b perform contrast amendment of the whole image, and are especially equipped also with the function which, in addition to this, amends sensibility dispersion of the photo detector 4 of infrared light by amendment section 10b.

[0020] Next, actuation of an image output is explained. All the components of the photo detector 3 of the light and the photo detector 4 of infrared light always carry out photo electric conversion of the image light, and are outputting the electrical signal. The image pick-up control section 11 controls an image sensor 2 within the section, i.e., perpendicular blanking time amount, which is not an image synchronizing with the Vertical Synchronizing signal outputted from the synchronizing signal generating section 12 to accumulate the electrical signals of all those pixels in each are recording output sections 5a and 5b all at once. The electrical signal of the image accumulated in each of these are recording output sections 5a and 5b Synchronizing with a pixel clock, it is read to the next image effective time of a perpendicular blanking. Each processing of the signal magnification by Amplifiers 9a and 9b, the brightness amendment by the amendment sections 10a and 10b, and superposition of each vertical/horizontal synchronizing signal by the superposition sections 13a and 13b is performed, and a visible image signal and an infrared picture signal are outputted to the exterior at coincidence.

[0021] Drawing 2 is drawing showing mixture arrangement with the photo detector 3 of the light of the 2nd invention, and the photo detector 4 of infrared light. As shown by a diagram, this arrangement arranges the photo detector 3 of the light for the horizontal direction of one line, and the photo detector 4 of the infrared light for the horizontal direction of one line by turns perpendicularly. This arrangement is suitable for the application which installs in a car etc. and performs monitors on the street, such as detection of the other car, and recognition of a body on the street, for example, it is advantageous arrangement and resolution is needed crosswise from the direction of distance of a road, when each image of the light and infrared light needs resolution horizontally perpendicularly.

[0022] Drawing 3 is drawing showing mixture arrangement with the photo detector 3 of the light of the 3rd invention, and the photo detector 4 of infrared light. As shown by a diagram, this arrangement arranges horizontally the photo detector 3 of the light for the perpendicular direction of one line, and the photo detector 4 of the infrared light for the perpendicular direction of one line by turns. It is suitable for the application to which each image of the light and infrared light installs this arrangement in horizontal high locations where it is advantageous arrangement in when you need resolution perpendicularly more, and resolution is needed in the direction of distance from the cross direction of a road, such as the style

of a gate path on the street, and it carries out road monitors, such as measurement of a traffic flow, and a monitor of an abnormality transit car.

[0023] Drawing 4 is drawing showing mixture arrangement with the photo detector 3 of the light of the 4th invention, and the photo detector 4 of infrared light. As shown by a diagram, this arrangement arranges the photo detector 3 of the light, and the photo detector 4 of infrared light in the shape of a checker. This arrangement is advantageous arrangement when each image of the light and infrared light needs uniform resolving power in each horizontal and vertical direction, for example, it is suitable for the application which performs recognition processing of the number plate of a car etc.

[0024] Gestalt 2. drawing 5 of operation is drawing showing the gestalt 2 of implementation of the 5th invention, and 8, 9a, 9b, 10a, 10b, 11, 12, 13a, 13b, 14a, 14b, 15, 16a, and 16b are the same as that of what is shown in said drawing 1 from 1, 5a, 5b, and 6 in drawing. 17 is the light reflex section reflected in the two directions of the direction towards the image sensor 20 of the light mentioned later, and the direction towards the image sensor of infrared light, for example, constitutes the image light which passes through a window 1 from prism of magnesium fluoride material. A light filter to reflect while and for 18 pass only the light out of image light in this light reflex section 17, An infrared light filter for 19 to pass only infrared light out of another [ which is reflected in the light reflex section 17 ] image light, They are the image sensor of the light which 20 receives the light which passes said light filter 18, and outputs the electrical signal of an image, and the image sensor of the infrared light which 21 receives the infrared light which passes said infrared light filter 19, and outputs the electrical signal of an image. Packaging of the image sensor 21 of this infrared light and the image sensor 20 of the light is carried out respectively independently, they are put in order, and are installed.

[0025] The image sensor 20 of the light consists of the things and are recording output section 5a which have arranged the photo detector 30 of the light by one screen. The image sensor 21 of infrared light consists of the things and are recording output section 5b which have stationed the light-receiving child 40 of infrared light by one screen. Although the photo detector 30 of the light is the same as the photo detector 3 of the light of said drawing 1, since it has the light filter 18 independently in this example, it is not necessary to equip each component front face with the band pass filter of the light. Moreover, in this example, although the photo detector 40 of infrared light is the same as the photo detector 4 of the infrared light of said drawing 1, since it has the infrared light filter 19 independently, it is not necessary to equip each component front face with the band pass filter of infrared light.

[0026] Peltier 6 and the temperature detecting element 7 are installed in the location which maintains both the image sensor 20 of the light, and the image sensor 21 of infrared light at constant temperature, in order to suppress the increment in the noise by the temperature change.

[0027] Each electrical signals of the light by which that of actuation of an image output was the same as that of the case of said drawing 1, and photo electric conversion was carried out by the photo detector 30 of the light and the photo detector 40 of infrared light, and infrared light are respectively accumulated all at once in one screen into perpendicular blanking time amount at each are recording output sections 5a and 5b, and are read to the next image effective time of a perpendicular blanking synchronizing with a pixel clock. Furthermore, a visible image signal and an infrared picture signal are outputted to coincidence outside through processing of each part of Amplifiers 9a and 9b, the amendment sections 10a and 10b, and the superposition sections 13a and 13b.

[0028] Gestalt 3. drawing 6 of operation is drawing showing the gestalt 3 of implementation of the 6th invention, and 14a, 14b, and 15 are the same tracks as what is shown in said drawing 1 in drawing. It is a track for 13c being the same as that of the superposition sections 13a and 13b of said drawing 1, and the superposition section for making the Vertical Synchronizing signal and Horizontal Synchronizing signal which are supplied from the synchronizing signal generating section 12 superimpose on a picture signal, and outputting outside as a composite picture signal, and 16c being the same as that of the tracks 16a and 16b of said drawing 1, and outputting a composite picture signal. 22 is the switch section which performs the switch output of the visible image signal from the amendment sections 10a and 10b and infrared picture signal which are inputted from Tracks 14a and 14b.

[0029] Although the switch activity of this switch section 22 differs by whether the switch section 22 is

applied to which configuration of said drawing 2 , drawing 3 , drawing 4 , and drawing 5 so that it may explain below, it has the advantage from which the output of any case is attained on the one track in the picture signal of the both sides of the light and infrared light.

[0030] When applying to the configuration of drawing 2 and drawing 5 first, a visible image signal and an infrared picture signal are switched and outputted synchronizing with a Vertical Synchronizing signal. As everyone knows, the usual picture signal divides one screen into the odd number field of only odd lines, and the even number field of only even lines, and outputs each field by turns. Since it is usually 60Hz, the field frequency, i.e., the perpendicular frequency, in that case, the mutual output of each picture signal of the light and infrared light will be respectively carried out by 30Hz.

[0031] On the other hand, when applying to the configuration of drawing 3 and drawing 4 , a visible image signal and an infrared picture signal are switched and outputted synchronizing with a pixel clock. In this case, field frequency will be outputted for each picture signal of the light and infrared light by 60Hz.

[0032]

[Effect of the Invention] Since according to the 1st invention it constituted so that mixture arrangement of the photo detector of dedication of the light and infrared light might be carried out at a plane at one image sensor and each electrical signal of a light image and an infrared light image might be read, processed and outputted independently to coincidence, it is effective in being able to acquire a visible image and an infrared image with few noises to coincidence, and compact equipment being obtained.

[0033] According to the 2nd invention, since mutual arrangement of the part for the horizontal direction of one line each of the photo detector of the light and the photo detector of infrared light was carried out perpendicularly, it is effective in horizontally sufficient resolution being obtained.

[0034] According to the 3rd invention, since mutual arrangement of the part for the perpendicular direction of one line each of the photo detector of the light and the photo detector of infrared light was carried out horizontally, it is effective in perpendicularly sufficient resolution being obtained.

[0035] According to the 4th invention, since the photo detector of the light and the photo detector of infrared light have been arranged in the shape of a checker, it is effective in resolution being obtained with balance sufficient in each direction perpendicular to a horizontal.

[0036] Since according to the 5th invention it had independently the image sensor of the light, and the image sensor of infrared light and it is not necessary to stuff the photo detector of the light, and the photo detector of infrared light into one image sensor, it is effective in being easy to manufacture.

[0037] Since it had the switch section which performs the switch output of a visible image signal and an infrared picture signal according to the 6th invention, it is effective in the ability to output both picture signals on the one track.

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CLAIMS

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[Claim(s)]

[Claim 1] The light emitted from the photographic subject which exists in the road, and the window which passes the image light containing infrared light, The photo detector of the light for receiving and carrying out photo electric conversion only of the light out of the image light which passes through this window, The image sensor which were intermingled near both component, and has arranged the photo detector of the infrared light for receiving and carrying out photo electric conversion only of the infrared light to the plane, [ two or more ] The temperature control section for maintaining this image sensor at constant temperature, and the 1st amplifier which amplifies the electrical signal of the visible image outputted from the photo detector of said light, The 2nd amplifier which amplifies the electrical signal of the infrared image outputted from the photo detector of said infrared light, The 1st amendment section which performs brightness amendment of the electrical signal which said 1st amplifier outputs, and outputs a visible image signal, Image pick-up equipment for a monitor on the street equipped with the 2nd amendment section which performs brightness amendment of the electrical signal which said 2nd amplifier outputs, and outputs an infrared picture signal, and the image pick-up control section which performs drive control of said image sensor.

[Claim 2] Image pick-up equipment for a monitor on the street according to claim 1 characterized by having the image sensor of the photo detector of the light, and the photo detector of infrared light which carries out mutual arrangement of the part for the horizontal direction of one line perpendicularly, and constitutes one screen respectively.

[Claim 3] Image pick-up equipment for a monitor on the street according to claim 1 characterized by having the image sensor of the photo detector of the light, and the photo detector of infrared light which carries out mutual arrangement of the part for the perpendicular direction of one line horizontally, and constitutes 1 screen sentence respectively.

[Claim 4] Image pick-up equipment for a monitor on the street according to claim 1 characterized by having the image sensor which arranges the photo detector of the light, and the photo detector of infrared light in the shape of a checker, and constitutes one screen.

[Claim 5] The light reflex section which divides into a 2-way the image light containing the light emitted from the photographic subject which exists in the road, and infrared light, The image sensor of the light which consists of the element number for one screen for [ while being reflected in this light reflex section ] receiving only the light out of image light and performing photo electric conversion, The image sensor of the infrared light which consists of the element number for one screen for receiving only infrared light out of another [ which is reflected in the light reflex section ] image light, and performing photo electric conversion, Peltier for maintaining the image sensor of this infrared light at constant temperature, and the temperature detecting element which detects the temperature of the image sensor of infrared light and outputs a temperature signal, The Peltier control section which inputs this temperature signal and controls said Peltier, The 1st amplifier which amplifies the electrical signal of the visible image outputted from the image sensor of said light, The 2nd amplifier which amplifies the electrical signal of the infrared image outputted from the image sensor of said infrared light, The 1st

amendment section which performs brightness amendment of the electrical signal which said 1st amplifier outputs, and outputs a visible image signal, Image pick-up equipment for a monitor on the street equipped with the 2nd amendment section which performs brightness amendment of the electrical signal which said 2nd amplifier outputs, and outputs an infrared picture signal, and the image pick-up control section which performs drive control of said 1st and 2nd image sensors.

[Claim 6] Claim 1 characterized by adding the switch section which performs the switch output of the visible image signal which the 1st amendment section outputs, and the infrared picture signal which the 2nd amendment section outputs, claim 2, claim 3, claim 4, and image pick-up equipment for a monitor on the street according to claim 5.

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**TECHNICAL FIELD**

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[Field of the Invention] This invention is installed in the style of a gate, a car, etc. path on the street, and relates to the image pick-up equipment for a monitor on the street for supervising existence, such as an obstruction on the street, by the image all day and night.

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PRIOR ART

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[0004] Moreover, as another example of this conventional kind of equipment, there is a compound sensor mold vehicle detector indicated by the patent official report (it is hereafter described as an official report 2) of No. 2850890. Drawing 8 is drawing showing the configuration of the compound sensor mold vehicle detector indicated by the official report 2, and, as for the image pick-up section and 820, 810 is [ the environmental measurement section and 830 ] the signal-processing sections in drawing. The image pick-up section 810 consists of visible CCD camera 811 and an infrared region image pick-up camera 812. The environmental measurement section 820 consists of an illuminometer 821 and a

thermometer 822. The signal-processing section 830 consists of video A/D converters 831 and 833, frame memories 832 and 834, a digital signal processor (it is hereafter described as DSP) 835, CPU836, external output I/F837, and A/D converters 838 and 839.

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**EFFECT OF THE INVENTION**

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**TECHNICAL PROBLEM**

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[Problem(s) to be Solved by the Invention] In the conventional technique which the equipment by the conventional technique is the above configurations, and is indicated by the official report 1, since it was constituted so that two kinds of images of infrared cut-off filter \*\* / nothing might be switched and outputted according to an environment condition, the technical problem that both images were unacquirable to coincidence occurred. Moreover, since it was the configuration image formation of the image of the both sides of the light and infrared light is carried out [ configuration ] to the image sensor of the same quality of the material with infrared cut-off filter \*\* / non-chisel, the technical problem that the noise of the infrared image at the time of infrared cut-off filter nothing became large occurred.

[0007] Moreover, in the conventional technique indicated by the official report 2, since it was the configuration separately equipped with the camera for the lights, and the camera for infrared light, the technical problem that equipment became large occurred.

[0008] This invention was made in order to cancel the above technical problems, and it aims at being able to acquire a visible image and an infrared image with few noises to coincidence, and obtaining the compact image pick-up equipment for a road monitor.

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[Translation done.]

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**MEANS**

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[Means for Solving the Problem] The window which passes the image light in which the image pick-up equipment for a road monitor by the 1st invention contains the light and infrared light, The photo detector of the light for receiving only the light out of the image light which passes through this window, The image sensor which carried out mixture arrangement of the photo detector of the infrared light for receiving only infrared light near both component, Peltier for maintaining this image sensor at constant temperature, and the temperature control section which performs temperature control of an image sensor, The 1st and 2nd amplifiers which it has corresponding to the photo detectors of the light and infrared light, and amplify the electrical signal of an image, It has the 1st amendment section which performs brightness amendment of the electrical signal which this 1st amplifier outputs, and the 2nd amendment section which performs brightness amendment of the electrical signal which the 2nd amplifier outputs, and it constitutes so that a visible image signal and an infrared picture signal may be outputted separately.

[0010] the image pick-up equipment for a monitor on the street by the 2nd invention is equipped with the image sensor which carries out mutual arrangement of the horizontal direction [ of the light and infrared light ] of each photo detector of every one line perpendicularly, and constitutes one screen.

[0011] the image pick-up equipment for a monitor on the street by the 3rd invention is equipped with the image sensor which carries out mutual arrangement of the perpendicular direction [ of the light and infrared light ] of each photo detector of every one line horizontally, and constitutes one screen.

[0012] The image pick-up equipment for a monitor on the street by the 4th invention is equipped with the image sensor which arranges each photo detector of the light and infrared light in the shape of a checker, and constitutes one screen.

[0013] The window which passes the image light in which the image pick-up equipment for a monitor on the street by the 5th invention contains the light and infrared light, The image sensor of the light which consists of the element number for one screen for while being reflected and receiving only the light out of image light in the light reflex section which reflects in a 2-way the image light which passes through this window, and this light reflex section, The image sensor of the infrared light which consists of the element number for one screen for receiving only infrared light out of another image light, Peltier for maintaining the image sensor of this infrared light at constant temperature, and the temperature detecting element which detects the temperature of the image sensor of infrared light, The Peltier control section which controls Peltier based on this temperature, and the 1st and 2nd amplifiers which it has corresponding to the photo detectors of the light and infrared light, and amplify the electrical signal of an image, It has the 1st amendment section which performs brightness amendment of the electrical signal which this 1st amplifier outputs, and the 2nd amendment section which performs brightness amendment of the electrical signal which the 2nd amplifier outputs, and it constitutes so that a visible image signal and an infrared picture signal may be outputted separately.

[0014] The image pick-up equipment for a monitor on the street by the 6th invention adds the switch section which performs the switch output of the visible image signal which the 1st amendment section outputs, and the infrared picture signal which the 2nd amendment section outputs.

[0015]

[Embodiment of the Invention] Gestalt 1. drawing 1 of operation is drawing showing the gestalt 1 of implementation of the 1st invention. In drawing, 1 is a window which passes the image light containing the light emitted from the photographic subject which exists in the road, and infrared light, for example, is manufactured by magnesium fluoride material. 2 is an image sensor which receives the image light which passes through this window 1, and outputs the electrical signal of an image. Two or more these image sensors 2 are intermingled near both component, arrange the photo detector 3 of the light for receiving and carrying out photo electric conversion only of the light, and the photo detector 4 of the infrared light for receiving and carrying out photo electric conversion only of the infrared light to a plane, and are equipped with the are recording output sections 5a and 5b for accumulating the electrical signal of an image temporarily and outputting it corresponding to each photo detectors 3 and 4. Moreover, with the window 1, the hermetic seal of the image sensor 2 is carried out, and it is packed. Peltier for 6 to maintain this image sensor 2 at constant temperature, the temperature detecting element which 7 detects the temperature of an image sensor 2 and outputs a temperature signal, The Peltier control section which 8 inputs this temperature signal and controls said Peltier 6, The 1st amplifier for 9a to amplify the electrical signal of the light image outputted from are recording output section 5a in said image sensor 2, The 2nd amplifier for 9b to amplify the electrical signal of the infrared light image outputted from are recording output section 5b in said image sensor 2, The 1st amendment section which 10a performs brightness amendment of the electrical signal which said 1st amplifier 9a outputs, and outputs a visible image signal, The 2nd amendment section which 10b performs brightness amendment of the electrical signal which said 1st amplifier 9b outputs, and outputs an infrared picture signal, and 11 are image pick-up control sections which perform drive control of said image sensor 2. 12 is the synchronizing signal generating section for generating the Vertical Synchronizing signal of 1 field period of an image, the Horizontal Synchronizing signal of a horizontal the period of one line, the pixel clock in a cycle of 1 pixel, etc., and supplying each part. It is the superposition section which is made to superimpose 13a on the visible image signal with which said amendment section 10a outputs the Vertical Synchronizing signal supplied from this synchronizing signal generating section 12, and a Horizontal Synchronizing signal, is made to superimpose the superposition section outputted outside as a composite picture signal, and 13b on the infrared picture signal with which said amendment section 10b outputs the Vertical Synchronizing signal supplied from said synchronizing signal generating section 12, and a Horizontal Synchronizing signal, and is outputted outside as a composite picture signal. A track for a track for 14a and 14b to transmit each picture signal outputted from said amendment sections 10a and 10b and 15 to transmit the Vertical Synchronizing signal, Horizontal Synchronizing signal, and pixel clock which are outputted from said synchronizing signal generating section 12, and 16a and 16b are the tracks for outputting outside each composite picture signal outputted from said superposition sections 13a and 13b.

[0016] The material of the photo detector 3 of the light is silicon (Si) generally used as a photo detector for the lights, and the band pass filter which passes only the 770nm so-called light from the wavelength of 390nm is added to the front face of each component. On the other hand, the material of the photo detector 4 of infrared light is a vanadium oxide (VOx) which is easy to receive infrared light, and the band pass filter which passes only the limited wavelength range in the so-called infrared light, such as 8 to 12 etc. micrometers, from the wavelength of 3 micrometers is added to the front face of each component. [ 5 micrometers or ] In addition, each one component is equivalent to 1 pixel of an image.

[0017] An infrared image is the so-called temperature image like common knowledge, and since a difference will arise in the light-receiving sensibility of each component if the temperature of each component of the photo detector 4 of infrared light varies, a noise will occur in an image. Peltier 6 is for maintaining the photo detector 4 of each infrared light at constant temperature, such as 40 etc. degrees C. On the other hand, since there is dispersion in the sensibility by a little temperature also in the photo detector 3 of the light, also keeping the photo detector 3 of the light together to constant temperature by Peltier 6 also makes the noise of a visible image reduced.

[0018] Since the electrical signal of the image which each are recording output sections 5a and 5b output

is feeble, it needs magnification of signal amplitude. In Amplifiers 9a and 9b, while performing this amplitude magnification, it also has the function to perform the so-called sample hold which holds uniformly the magnification to a time-axis with a pixel clock, i.e., 1-pixel section signal level.

[0019] The amendment sections 10a and 10b perform contrast amendment of the whole image, and are especially equipped also with the function which, in addition to this, amends sensibility dispersion of the photo detector 4 of infrared light by amendment section 10b.

[0020] Next, actuation of an image output is explained. All the components of the photo detector 3 of the light and the photo detector 4 of infrared light always carry out photo electric conversion of the image light, and are outputting the electrical signal. The image pick-up control section 11 controls an image sensor 2 within the section, i.e., perpendicular blanking time amount, which is not an image synchronizing with the Vertical Synchronizing signal outputted from the synchronizing signal generating section 12 to accumulate the electrical signals of all those pixels in each are recording output sections 5a and 5b all at once. The electrical signal of the image accumulated in each of these are recording output sections 5a and 5b Synchronizing with a pixel clock, it is read to the next image effective time of a perpendicular blanking. Each processing of the signal magnification by Amplifiers 9a and 9b, the brightness amendment by the amendment sections 10a and 10b, and superposition of each vertical/horizontal synchronizing signal by the superposition sections 13a and 13b is performed, and a visible image signal and an infrared picture signal are outputted to the exterior at coincidence.

[0021] Drawing 2 is drawing showing mixture arrangement with the photo detector 3 of the light of the 2nd invention, and the photo detector 4 of infrared light. As shown by a diagram, this arrangement arranges the photo detector 3 of the light for the horizontal direction of one line, and the photo detector 4 of the infrared light for the horizontal direction of one line by turns perpendicularly. This arrangement is suitable for the application which installs in a car etc. and performs monitors on the street, such as detection of the other car, and recognition of a body on the street, for example, it is advantageous arrangement and resolution is needed crosswise from the direction of distance of a road, when each image of the light and infrared light needs resolution horizontally perpendicularly.

[0022] Drawing 3 is drawing showing mixture arrangement with the photo detector 3 of the light of the 3rd invention, and the photo detector 4 of infrared light. As shown by a diagram, this arrangement arranges horizontally the photo detector 3 of the light for the perpendicular direction of one line, and the photo detector 4 of the infrared light for the perpendicular direction of one line by turns. It is suitable for the application to which each image of the light and infrared light installs this arrangement in horizontal high locations where it is advantageous arrangement in when you need resolution perpendicularly more, and resolution is needed in the direction of distance from the cross direction of a road, such as the style of a gate path on the street, and it carries out road monitors, such as measurement of a traffic flow, and a monitor of an abnormality transit car.

[0023] Drawing 4 is drawing showing mixture arrangement with the photo detector 3 of the light of the 4th invention, and the photo detector 4 of infrared light. As shown by a diagram, this arrangement arranges the photo detector 3 of the light, and the photo detector 4 of infrared light in the shape of a checker. This arrangement is advantageous arrangement when each image of the light and infrared light needs uniform resolving power in each horizontal and vertical direction, for example, it is suitable for the application which performs recognition processing of the number plate of a car etc.

[0024] Gestalt 2. drawing 5 of operation is drawing showing the gestalt 2 of implementation of the 5th invention, and 8, 9a, 9b, 10a, 10b, 11, 12, 13a, 13b, 14a, 14b, 15, 16a, and 16b are the same as that of what is shown in said drawing 1 from 1, 5a, 5b, and 6 in drawing. 17 is the light reflex section reflected in the two directions of the direction towards the image sensor 20 of the light mentioned later, and the direction towards the image sensor of infrared light, for example, constitutes the image light which passes through a window 1 from prism of magnesium fluoride material. A light filter to reflect while and for 18 pass only the light out of image light in this light reflex section 17, An infrared light filter for 19 to pass only infrared light out of another [ which is reflected in the light reflex section 17 ] image light, They are the image sensor of the light which 20 receives the light which passes said light filter 18, and outputs the electrical signal of an image, and the image sensor of the infrared light which 21 receives the

infrared light which passes said infrared light filter 19, and outputs the electrical signal of an image. Packaging of the image sensor 21 of this infrared light and the image sensor 20 of the light is carried out respectively independently, they are put in order, and are installed.

[0025] The image sensor 20 of the light consists of the things and are recording output section 5a which have arranged the photo detector 30 of the light by one screen. The image sensor 21 of infrared light consists of the things and are recording output section 5b which have stationed the light-receiving child 40 of infrared light by one screen. Although the photo detector 30 of the light is the same as the photo detector 3 of the light of said drawing 1, since it has the light filter 18 independently in this example, it is not necessary to equip each component front face with the band pass filter of the light. Moreover, in this example, although the photo detector 40 of infrared light is the same as the photo detector 4 of the infrared light of said drawing 1, since it has the infrared light filter 19 independently, it is not necessary to equip each component front face with the band pass filter of infrared light.

[0026] Peltier 6 and the temperature detecting element 7 are installed in the location which maintains both the image sensor 20 of the light, and the image sensor 21 of infrared light at constant temperature, in order to suppress the increment in the noise by the temperature change.

[0027] Each electrical signals of the light by which that of actuation of an image output was the same as that of the case of said drawing 1, and photo electric conversion was carried out by the photo detector 30 of the light and the photo detector 40 of infrared light, and infrared light are respectively accumulated all at once in one screen into perpendicular blanking time amount at each are recording output sections 5a and 5b, and are read to the next image effective time of a perpendicular blanking synchronizing with a pixel clock. Furthermore, a visible image signal and an infrared picture signal are outputted to coincidence outside through processing of each part of Amplifiers 9a and 9b, the amendment sections 10a and 10b, and the superposition sections 13a and 13b.

[0028] Gestalt 3. drawing 6 of operation is drawing showing the gestalt 3 of implementation of the 6th invention, and 14a, 14b, and 15 are the same tracks as what is shown in said drawing 1 in drawing. It is a track for 13c being the same as that of the superposition sections 13a and 13b of said drawing 1, and the superposition section for making the Vertical Synchronizing signal and Horizontal Synchronizing signal which are supplied from the synchronizing signal generating section 12 superimpose on a picture signal, and outputting outside as a composite picture signal, and 16c being the same as that of the tracks 16a and 16b of said drawing 1, and outputting a composite picture signal. 22 is the switch section which performs the switch output of the visible image signal from the amendment sections 10a and 10b and infrared picture signal which are inputted from Tracks 14a and 14b.

[0029] Although the switch activity of this switch section 22 differs by whether the switch section 22 is applied to which configuration of said drawing 2, drawing 3, drawing 4, and drawing 5 so that it may explain below, it has the advantage from which the output of any case is attained on the one track in the picture signal of the both sides of the light and infrared light.

[0030] When applying to the configuration of drawing 2 and drawing 5 first, a visible image signal and an infrared picture signal are switched and outputted synchronizing with a Vertical Synchronizing signal. As everyone knows, the usual picture signal divides one screen into the odd number field of only odd lines, and the even number field of only even lines, and outputs each field by turns. Since it is usually 60Hz, the field frequency, i.e., the perpendicular frequency, in that case, the mutual output of each picture signal of the light and infrared light will be respectively carried out by 30Hz.

[0031] On the other hand, when applying to the configuration of drawing 3 and drawing 4, a visible image signal and an infrared picture signal are switched and outputted synchronizing with a pixel clock. In this case, field frequency will be outputted for each picture signal of the light and infrared light by 60Hz.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is drawing showing the gestalt 1 of operation of the image pick-up equipment for a monitor on the street by this invention.

[Drawing 2] It is drawing showing the perpendicular mutual arrangement of each photo detector of the light of the image pick-up equipment for a monitor on the street, and infrared light by this invention.

[Drawing 3] It is drawing showing the level mutual arrangement of each photo detector of the light of the image pick-up equipment for a monitor on the street, and infrared light by this invention.

[Drawing 4] It is drawing showing the checker-like arrangement of each photo detector of the light of the image pick-up equipment for a monitor on the street, and infrared light by this invention.

[Drawing 5] It is drawing showing the gestalt 2 of operation of the image pick-up equipment for a monitor on the street by this invention.

[Drawing 6] It is drawing showing the gestalt 3 of operation of the image pick-up equipment for a monitor on the street by this invention.

[Drawing 7] It is drawing showing conventional obstruction detection equipment.

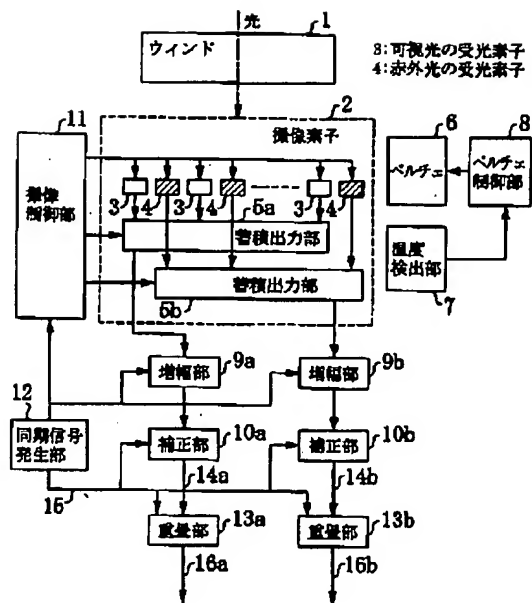
[Drawing 8] It is drawing showing the conventional compound sensor mold vehicle detector.

[Description of Notations]

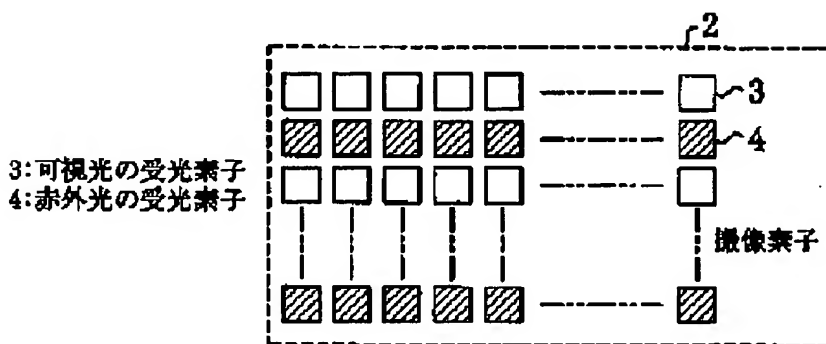
1 A window, 2 3 An image sensor, 30 4 The photo detector of the light, 40 The photo detector of infrared light, 6 Peltier, 7 A temperature detecting element, 8 The Peltier control section, 9a, 9b Amplifier, 10a, 10b The amendment section, 11 An image pick-up control section, 17 The light reflex section, 20 The image sensor of the light, 21 The image sensor of infrared light, 22 Switch section.

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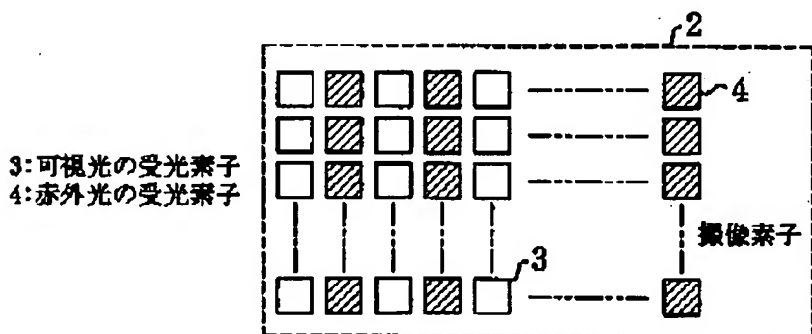
[Translation done.]



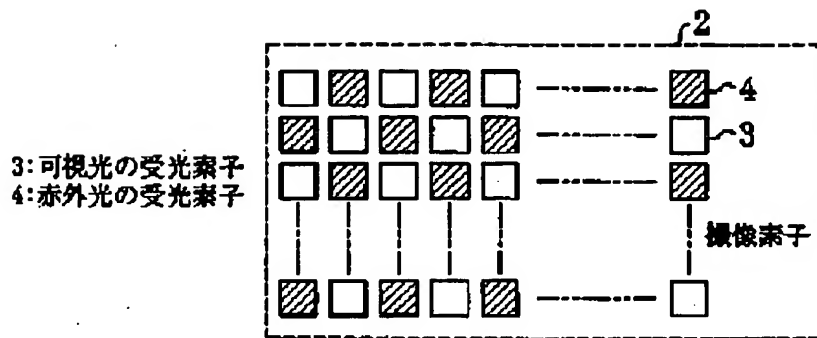
Drawing 1



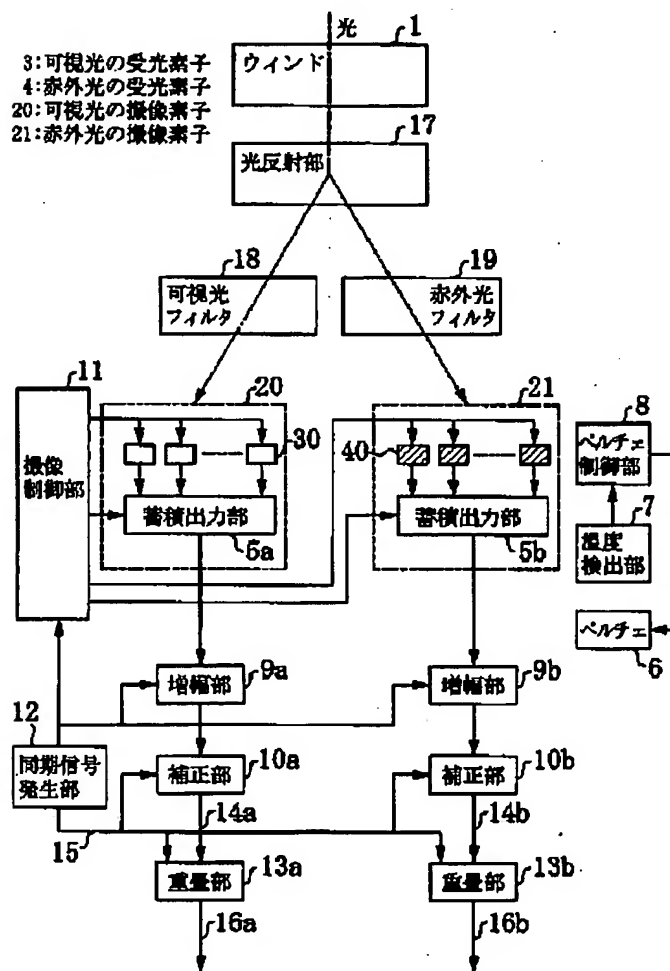
Drawing 2



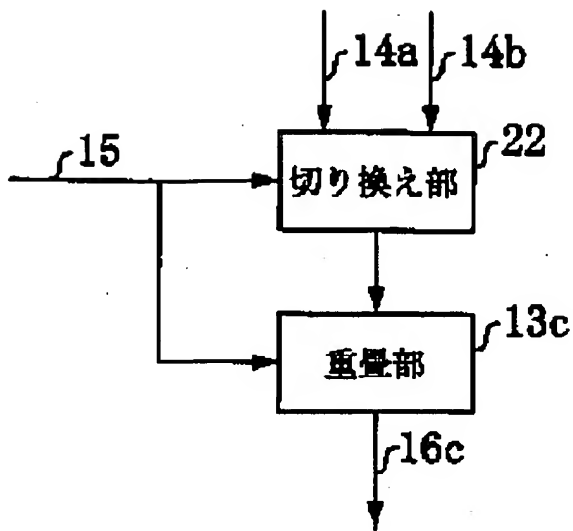
Drawing 3



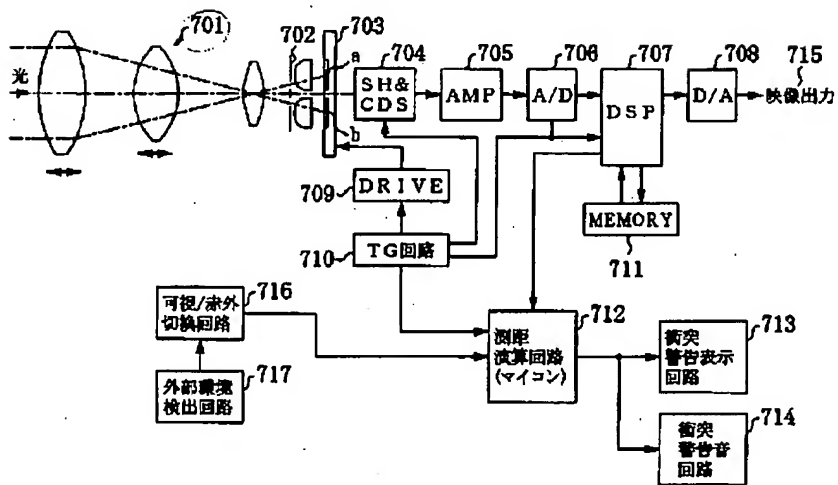
Drawing 4



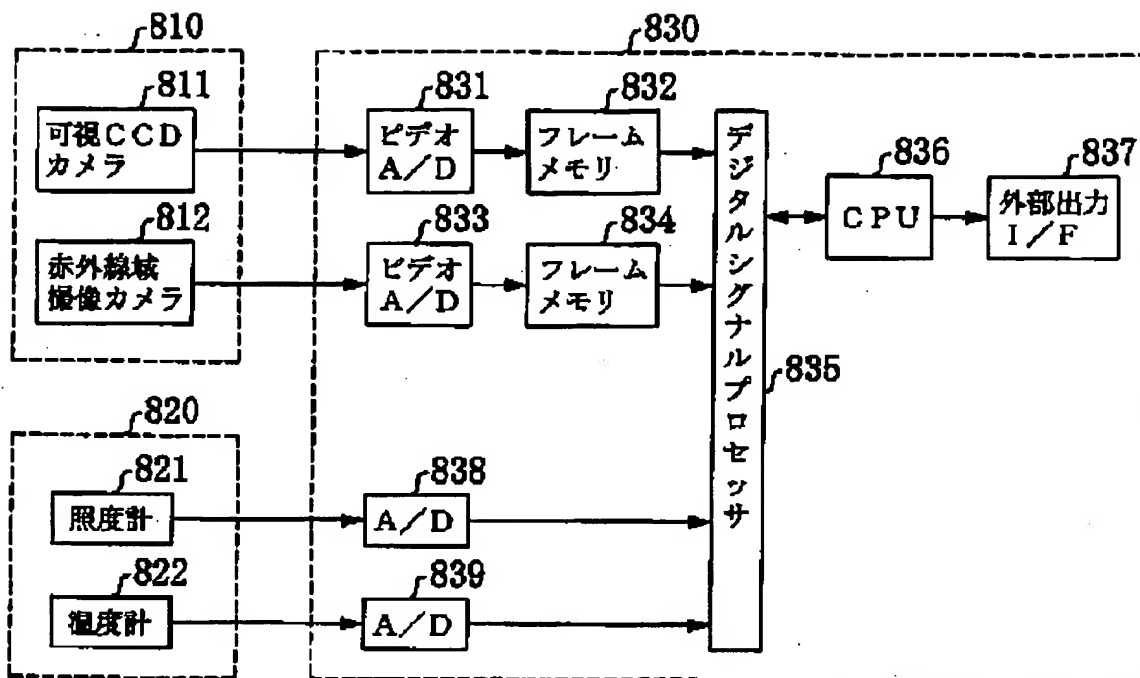
Drawing 5



Drawing 6



Drawing 7



Drawing 8